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Update to Clients

Update

IN THE NEWS

Lahbib Chibani Assumes Ownership of Sadat Associates



Sadat Associates, Inc. (SAI) is pleased to announce the transfer of ownership of the company from Dr. Marwan Sadat, P.E., Founder of the firm, to Dr. Lahbib Chibani, P.E., President of SAI.

"We worked on this transition for several months, and I'm happy that everyone involved will benefit from it," says Dr. Chibani.

"I've worked with Dr. Chibani for many years, and I have complete confidence in his judgment and his abilities," adds Dr. Sadat. "The company couldn't have gained a better leader to keep SAI moving forward."

SAI was founded in 1986 as an environmental science consulting and engineering firm. Located in Trenton, NJ, the firm's reputation for unique and creative solutions stemmed from the many years that its founder and key staff served in regulatory agencies.

By combining regulatory experience with advanced engineering and environmental science, the firm was able to achieve many accomplishments:

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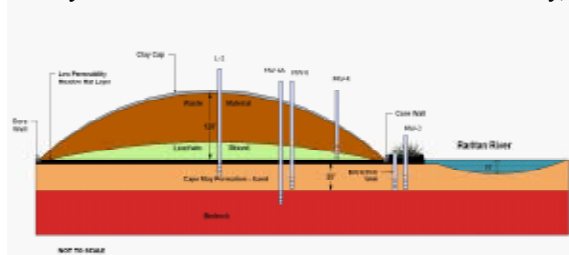
Innovative analysis makes case to DEP for turning off pumping system

SAI Project Manager Dr. Emery Coppola Jr., P.G., presented a paper entitled "Estimating the Effects of Leachate-Impacted Groundwater on a Tidal River" at the 18th International Conference on Water Recycle and Wastewater Treatment. The conference was held in Havana, Cuba in November 2016.

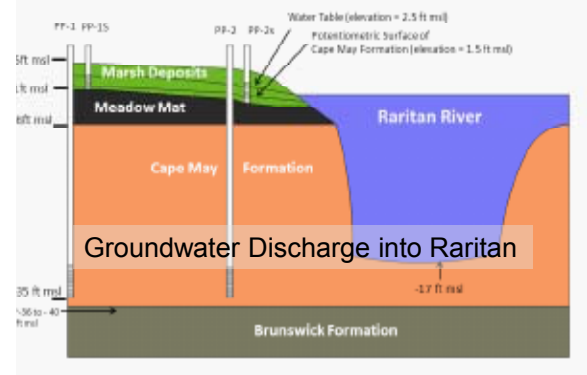
Dr. Coppola's presentation gave an overview of a study completed by SAI that investigated potential impacts of a large municipal solid waste landfill on the Raritan River in Middlesex County, NJ. The project, performed over a two-year period, included extensive field studies, sophisticated chemical analysis using isotopes, and advanced computer modeling. Contributors to the study included Dr. Marwan M. Sadat, P.E., Dr. Il Kim, Diane Trube, Rich Kurisko and Colin McCaddin.

The landfill is closed in 1987 and has an engineered clay cap, a vertical hydraulic barrier (i.e. core wall) installed around the landfill, a groundwater recovery system, a stormwater management system, and a groundwater monitoring program in place since the mid-1980s.

SAI wanted to make a strong technical argument to the DEP to turn off the hydraulic barrier system designed and constructed in lieu of a leachate collection system at the site because it was not necessary,



Geologic cross section with engineering controls



Geologic cross section at river boundary

as the landfill is not measurably impacting the water quality of the Raritan River. Prior to our study, there was never a serious effort to address this issue.

The hydraulic barrier collection system (14 extraction wells and forcemain), designed by the previous consultant, was costing the client a substantial amount of money to maintain, and operating far below its required design standard (50,000 gpd). Our modeling showed that its design was about three times too low for achieving the required hydraulic control. In the course of evaluating the system, we began to suspect that the landfill was not impacting the river (based on preliminary groundwater flow and transport estimates, etc.).

The study confirmed this.

The modeling results helped demonstrate that because of natural attenuation, the landfill does not have a measurable impact on the river. This was confirmed by an extensive surface water quality study. Based upon the modeling and study results, formal

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Isotope analysis gives high level of accuracy for clients

SAI Project Manager Dr. Emery Coppola's presentation (see page 1) entitled "Estimating the Effects of Leachate-Impacted Groundwater on a Tidal River" gave an overview of an SAI study of a solid waste landfill on the Raritan River in Middlesex County, NJ. The project included extensive field studies, sophisticated chemical analysis using isotopes, and advanced computer modeling. More detail about the studies follows.

Field studies performed by SAI included aquifer pumping tests, a synoptic water level study of the groundwater/surface water system, a surface water quality study, and a bathymetric and flow survey of the Raritan River.

Numerous models were developed and used to simulate groundwater contaminant transport and surface water quality impacts.

Groundwater models MODFLOW with MT3DMS were used to simulate the transport of potential contaminants of concern from the down-gradient edge of the landfill to the Raritan River shoreline.

A surface water dispersion model based upon the bathymetric and flow study of the river was used to simulate the contaminant concentrations over space within the river.

The isotope analysis (types of isotopes) that we performed is rare, so much so that after having reached out to Columbia University, Woods Hole, etc. we could only find one laboratory in the U.S., operated by the United States Geological Survey, that had the analytical capabilities to do the work.

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New SAI owner Lahbib Chibani looks to the future

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- Serving over 2,100 clients, comprised of state, county and local governmental agencies as well as private industry;
- Spearheading the redevelopment of brownfields, including and specializing in landfills; and
- Pioneering a variety of creative and innovative environmental solutions, such as tracing the origin of soil, sediment, water, and air contaminants by using radioisotopes.

SAI was integral in redeveloping the former Elizabeth City municipal landfill into what eventually became The Mills at Jersey Gardens. This mall draws shoppers not only from New York City, but also from around the world. This was the first successful project in New Jersey to transform a contaminated landfill and brown-field area into commercial real estate.

Other notable SAI projects throughout the years include:

- Redevelopment of the North Wildwood Landfill

into The Tides at Seaboard Point, a 96-unit residential community;

- Redevelopment of the former GAF factory site in South Bound Brook into Canal Crossing residential community;
- Closure of six partially closed landfills in the Meadowlands; and
- Remediation, closure and redevelopment of the former PJP Landfill, a USEPA Superfund site, into a thriving warehouse complex in Jersey City

Dr. Chibani's vision for the future of the firm "...is to stay in the forefront of environmental science and engineering by involving everyone in the company in creating its future. Among others, we will continue providing services related to environmental balance, whether through renewable energy, greenhouse gas reduction, ecological restoration, sustainability and storm resiliency, and redevelopment to promote more efficient land use, and other creative solutions."

Innovative analysis

Continued from Page 1

to the state regulatory agency. These changes will help ensure that the existing financial resources of the landfill are judiciously used to address legitimate environmental issues.

The conference, sponsored by World Academy of Science, Engineering, and Technology, brought together leading academic scientists, researchers and research scholars to exchange and share their experiences and research results on all aspects of Water Recycle and Wastewater Treatment. It also provided a premier interdisciplinary platform for researchers, practitioners and educators to present and discuss the most recent innovations, trends, and concerns as well as practical challenges encountered and solutions adopted in the fields of Water Recycle and Wastewater Treatment.



SAI was honored with "Best Presentation Award" at the end of the conference.

NOTE: See page 4 for photos from Dr. Coppola's trip to Cuba

From the Editor -

If you would like to receive a full-color electronic version of our newsletter in Adobe PDF format via email, or if you want additional information about SAI and its services, please send an email to: kkane@sadat.com.

Thanks — we look forward to hearing from you.

SAI helps Pennsauken property owner prepare brownfield, landfill site for solar installations

A 140-acre site in Pennsauken is being developed as home to a major solar array. The property, on River Road, includes the site of a former cast iron foundry and porcelain fixtures manufacturing facility. Bordered to the north by the Delaware River and to the south by River Road and railroad tracks, the site includes wetlands and riparian land, a former landfill, vacant land considered to be brownfields, and the now-demolished 230,000-square-foot manufacturing facilities. Slag from the foundry was deposited in the landfill on site.



The property is being developed by SAI client Vineland Construction Co. (VCC).

The New Jersey Board of Public Utilities (BPU) encourages solar development at brownfield sites and properly closed landfills. In the case of brownfields, the BPU will only approve solar projects at sites that have an approved Remedial Action Workplan (RAWP) but have not undergone remediation. Landfills, on the other hand, must be properly closed in order to be considered for solar development by the BPU.

The planned solar array is being developed in two phases. The first phase will cover the brownfields area and the location of the former warehouse building. VCC applied for Subsection t (Solar Act of 2012) approval with the BPU for the brownfields area since that area is the subject of a RAWP, previously prepared by a consultant who worked for the former property owner.

The former owner, Universal Rundle, has accepted responsibility for cleanup of this portion of the property, which was contaminated as the result of the prior manufacturing operations.

The first phase of the solar installation is expected to generate about 9 megawatts, which is enough

to power more than 1,300 homes, according to the Solar Energy Industries Association.

The brownfield area is about 30 acres. The former warehouse was demolished in 2016, and the bricks and concrete were crushed into recycled concrete aggregate and used to fill the building basement. Because of soil and water contamination, 20 acres of the brownfield area was capped with an impermeable material. The additional 10 acres was previously wooded; the area is now cleared. The entire site will be topped with 6 inches of stone as the subgrade for the solar panels. The arrays in this section will sit on ballasts placed on the surface of the capped area so as not to compromise the impermeable cap.

In the future, VCC plans to submit a Landfill Closure Plan and cap the landfill. The future arrays in the landfill area will be on helical piles.

SAI tasks have included: stormwater calculations, preparation of civil engineering drawings, geotechnical engineering services for the array support system, and permitting, including waterfront development, flood hazard, wetlands and permits for township approval. Future tasks will include preparation of landfill closure and post-closure applications and associated permits.

Isotope analysis

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Isotopic composition in landfill leachate shows more distinct isotopic characteristics than the natural groundwater since the isotopic composition is affected by physical, chemical and biological processes that act on the leachate as it moves through solid waste.

By testing for isotopes at different locations both within the leachate and with different distances from the landfill, we could differentiate between natural sources of contaminants—like arsenic—and the anthropogenic landfill source.

In addition, the isotope study provided us with insights that affect groundwater contaminant transport, which we included in our modeling. These results further supported our modeling efforts and substantiated groundwater and surface water quality sampling results.

SAI provides environmental engineering services including fingerprinting studies using isotopic studies to trace the origin and path of pollution in groundwater, surface water, soil and air media.

Bowling for Kids

A team from SAI attended the annual Ninth Annual SYF Bowling for Education to benefit Simon Youth Foundation.



From left: Khaled Benslimane, Lisa Thompson, Il Kim and Lahbib Chibani

The mission of Simon Youth Foundation is to foster and improve educational opportunities, career development, and life skills that transform the lives of at-risk youth through focused programs and initiatives with public school and post-secondary education partners.

The event was held October 6, 2016 at Bowlmor Long Island, in Melville, NJ.

Views of Cuba

While in Cuba at a conference (see page 1), Dr. Emery Coppola had time to tour historic Havana with its vintage cars and cafes, including the cafe where Hemingway spent time writing "The Old Man and the Sea."

He also visited the beautiful Zapata nature reserve, home to the Bee Hummingbird—the world's smallest bird—and the Cuban Crocodile, which was once widespread throughout the Caribbean, but today lives only in Cuba.



Above left: A Cuban crocodile and a classic car; and right, a hydrogeologist's dream, a 250 feet deep Karst pool that has a subterranean connection to the ocean.

UN conference presentation addresses waste, landfills and sustainability



Dr. Lahbib Chibani, P.E., President of SAI, was invited to present in conjunction with COP22, the annual United Nations conference on climate change, held last fall in Marrakech, Morocco.

In his presentation, titled "Waste Recycling & Reuse of Landfill Sites for Sustainable Development," Dr. Chibani discussed the avenues through which sustainability in waste management can be achieved. These include waste recycling, waste treatment, and reuse of landfill sites. He also described the key factors in attaining and maintaining successful sustainability:

- Integrated and indivisible goals, and balance in the three dimensions of sustainable development (economic, social and environment)
- Recycling and optimization of resources at all levels of the system
- System must address the threats posed by climate change and environmental degradation
- Reduction of greenhouse gases at all levels of the system
- Resilience and disaster reduction
- Must not impact or degrade natural resources (including freshwater resources, forests, land, seas and oceans)
- Protection of biodiversity, ecosystems, wetlands and wildlife
- Reduction and recycling of waste and beneficial reuse of materials

The importance of waste recycling was emphasized in the presentation. In addition to reducing energy consumption, greenhouse gas emissions and carbon fingerprints, waste recycling promotes sustainability

through reuse of materials such as compost for agriculture, paper, glass and aluminum for production of new materials, and recycled waste used as construction materials. Dr. Chibani discussed landfill sustainability in terms of waste treatment options. Landfill gas can be cogenerated and used to supply electricity. Leachate can be recirculated at the landfill to enhance biodegradation of waste, which results in additional waste settlement and thus additional space for more waste disposal. Leachate recirculation can also allow short-term stabilization of waste, thus reducing long-term impacts and allowing reuse of the site.

When landfills are redeveloped and reused, environmental monitoring can assure protection of human health and the environment and should include testing ground and surface water, air emissions, and stability. Inspection monitoring and reporting should be conducted according to the approved closure/post-closure plan for the site, and the potential for natural resource damages should be part of the long-term financial responsibility of the owner. The audience was keenly interested to learn that former landfills in the United States are being successfully reused, and particularly enthusiastic about Dr. Chibani's experience with redeveloping landfills as open space and bird habitat, solar fields, cogeneration plants, wetlands and habitat restoration, residential and commercial redevelopments, and even golf courses.

They appreciated the benefits from landfill reuse which include the generation of jobs, and for those landfills located in or near urban areas, the decrease in transportation which ultimately reduces greenhouse gases.